

# ENERGY EFFICIENCY: AN ESSENTIAL PART OF CANADA'S NET ZERO FUTURE

REPORT TO PARLIAMENT UNDER THE ENERGY EFFICIENCY ACT

2021-2022













Canada

Natural Resources Ressources naturelles Canada

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This past year has seen vast fluctuations: economic recovery and record-low unemployment alongside the rising cost of living, increasingly threatening severe weather events, and geo-political uncertainty. Amid all this, climate change has not taken a break. Global emissions and temperatures continue to rise along with domestic and global demand for countries such as Canada to take the necessary actions to fight climate change. Together, they present opportunities to create sustainable jobs and ensure

that Canada is a global leader in the low-carbon future.

In 2021, the Government of Canada committed to enhancing its emissions reduction target under the Paris Agreement to 40 to 45% below 2005 levels by 2030. *The Canadian Net-Zero Emissions Accountability Act* became law on June 29, 2021, enshrining in legislation Canada's commitment to achieve net-zero emissions by 2050.

In March 2022, the Government of Canada released the 2030 Emissions Reduction Plan: Canada's Next Steps to Clean Air and a Strong Economy, which builds on previous plans and reflects what is needed to reach net-zero by 2050. Now is the time for national action, to dig in and get to work.

Energy efficiency is an essential part of a net-zero future.

For example, Canada's third-highest source of emissions is the built environment. That is why in 2022, the Government committed to creating the Canada Green Buildings Strategy to lead the buildings sector to net-zero emissions by 2050. This strategy will mobilize the collective, national action needed to decarbonize our buildings through ongoing collaboration with key partners such as Indigenous Peoples and communities, provinces, territories, municipalities, businesses and industry.

This report also profiles areas in which the Government is leading by example in our own operations. That includes changes to the energy efficiency of fleet vehicles and buildings as well as regulatory improvements that will reduce energy consumption and support the Government's climate change objectives.

Together, we can contribute to a low-carbon future, increase Canadian competitiveness, drive economic growth, and work to keep life affordable, while enhancing communities along the way.

The Honourable Jonathan Wilkinson, P.C., M.P. Minister of Energy and Natural Resources



Canada has a legislated commitment under the *Canadian Net-Zero Emissions Accountability Act* to reduce greenhouse gas emissions (GHG) by 40 to 45% below 2005 levels by 2030 and to achieve net-zero emissions by 2050. In March 2022, the Government announced the 2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy (ERP), which describes actions to meet Canada's 2030 target and put us on a path to achieve net-zero by 2050.



Building on existing commitments outlined under the Pan-Canadian Framework on Clean Growth and Climate Change (2016) and A Healthy Environment and a Healthy Economy (2020), the ERP announced investments and a strategic direction to grow energy efficiency actions and drive deeper emissions reductions, including:



Charting a path to achieve a net-zero buildings sector by 2050



Enhancing efforts to decarbonize industry and support the adoption of clean technologies



Accelerating the adoption of zero-emission vehicles (ZEV)



Empowering community climate action, including projects to improve energy efficiency

This report shares how energy efficiency initiatives across multiple sectors and using alternative energy sources, including clean fuels, are all contributing to a net-zero future. The initiatives target homes, buildings, communities, industry, transportation, appliances, and other equipment.



Prioritizing the decarbonization of buildings is key to meeting our emissions reductions targets.

The buildings sector is the third-largest source of emissions in Canada.

## There are over **16 million dwellings and 482,000 commercial and public buildings** in Canada.

Most buildings standing today will still be in use in **30 years**, which means that in addition to constructing new buildings that achieve net-zero emissions, Canada needs to retrofit existing buildings to achieve its net-zero by **2050** goal.

Over **99%** of emissions from residential buildings and **96%** of emissions from commercial and institutional buildings come from space and water heating because of equipment that uses fossil fuels, such as natural gas furnaces, and because of the extra energy demand to heat and cool buildings that have poor envelope performance.

Constructing and renovating homes and buildings to be more energy-efficient can do more than just reduce emissions. It can also lower energy bills, raise property values and improve indoor air quality.

## FIGURE 1. CANADA'S GHG EMISSIONS BY ECONOMIC SECTOR (2021)



## GETTING TO A NET-ZERO BUILDINGS SECTOR: CANADA GREEN BUILDINGS STRATEGY

Achieving net-zero GHG emissions by 2050 requires a national approach to buildings decarbonization. To succeed, all levels of government, the private sector, communities and individuals across Canada will need to work together.

The 2030 Emissions Reduction Plan (ERP) announced a measure to develop and implement a National Net-Zero Emissions Building Strategy (the Canada Green Buildings Strategy). This commitment is also included in <u>the Minister of Energy</u> and Natural Resources 2021 mandate letter.

Soon after the March 2022 announcement in the ERP, federal departments began collaborating on the strategic themes in the Canada Green Buildings Strategy, which will mobilize national action to transform markets and reduce costs to meet this goal.

## WHY DO WE NEED THE CANADA GREEN BUILDINGS STRATEGY?

Decarbonizing buildings requires leadership, innovation and investment.

The Canada Green Buildings Strategy will mobilize national action to transform markets and reduce costs to meet this goal.

To succeed, all levels of government, the private sector, communities and individuals across Canada will need to work together.



In May 2021, the Government of Canada launched the **Canada Greener Homes Grant** to help Canadians make energy efficiency upgrades to their homes and save on their monthly energy bills with grants of up to \$5,000 to cover the costs of eligible home retrofits and up to \$600 toward the costs of EnerGuide evaluations.

Over 171,000 applications were received in the first 11 months after the launch, and more than \$38 million in grants were issued to 10,300 homeowners.

The complement of energy advisors increased from 948 to 1,400 in the same period through actions taken by the private sector and the Government.

In addition to the grants, Budget 2021 announced the **Canada Greener Homes Loan** – which provides \$4.4 billion to help up to 175,000 homeowners complete deep home retrofits through interest-free loans of up to \$40,000.

The Canada Greener Homes Loan includes a dedicated stream of funding to support not-for-profit and cooperative buildings that serve low-income renters.



## GROWING THE COMPLEMENT OF ENERGY ADVISORS

In May 2021, a \$10-million call for proposals was announced to train an additional 2,000 energy advisors, nearly tripling the number of advisors across Canada.

Energy advisors are the backbone of the Canada Greener Homes Initiative. To ensure that retrofits improve a home's energy efficiency and that homeowners understand the most impactful retrofit options, an energy advisor must conduct a pre-retrofit and post-retrofit EnerGuide evaluation. The initiative's immense popularity has led to a major demand for evaluations and energy advisors across the country.

To help meet this demand, the Government organized and funded evaluation "travel blitzes" to reduce wait times for evaluations in rural and remote communities across Canada. By March 2022, 10 trips were organized, and 159 evaluations were completed.

More energy advisors are being hired and trained across the country. Not only will they help to ensure timely and equitable access to evaluations, but these new energy advisors are expected to play an important role in achieving Canada's climate goals.



## HOMES, BUILDINGS AND COMMUNITIES

The following actions helped to accelerate high-performing retrofits and net-zero new construction, including systems that supported the uptake of new technologies, innovative financing models, and the next generation of skilled energy-efficiency workers.

### **EnerGuide Rating System for homes**

#### Building and energy codes

Agreements were established with 44 partners to use the **EnerGuide Rating System** (ERS) to leverage their residential incentive and new construction programs.

Over 50 partners across Canada - including provinces, territories, municipalities and utilities – use the ERS as the basis for incentive programs, code compliance and standards for new housing.

Over 3.3 million evaluations have been completed in the ERS database, with 202,000 ERS files received in 2021–2022, resulting in 2.1 PJ of energy savings. In March 2022, the National Research Council of Canada released the 2020 National Model Codes, including the National Energy Code of Canada for Buildings 2020. These updated construction codes will make Canadian homes and buildings safer, more accessible and more energy-efficient.

## ENERGY STAR® for homes, buildings and products

Over 183 buildings were certified through the ENERGY STAR program for existing commercial and institutional buildings.

The new ENERGY STAR Multifamily High Rise (New Construction) project was launched in Ontario, recognizing buildings that are at least 15% more energyefficient than those built to the provincial energy code.

The ENERGY STAR for Products program achieved an estimated 28.76 PJ of cumulative annual energy savings – enough energy to power over 402,000 homes for a year – and reduced GHG emissions by approximately 3.04 Mt. ENERGY STAR for New Homes certified over 6,400 new homes, resulting in over 10,000 GJ of energy savings because certified homes use 20% less energy than typical new homes.

In 2022, **17 organizations and 10 buildings** received ENERGY STAR Canada Awards for advancing energy efficiency and offering Canadians the most energy-efficient products and technologies available on the market.





## HOMES, BUILDINGS AND COMMUNITIES

### ENERGY STAR® Portfolio Manager

ENERGY STAR® Portfolio Manager® is a free tool that provides an online platform for building owners and operators to benchmark, monitor and report on building energy performance.

A new feature that tracks GHG intensity metrics was added to Portfolio Manager.

Over 29,000 commercial and institutional buildings were captured in Portfolio Manager. That represents 346 million m<sup>2</sup> of floor space – an increase of 10% from the previous year.

Nine training webinars for Portfolio Manager were held.

Funding of \$3.1 million was provided through Portfolio Manager, supporting 21 projects and resulting in the hiring of 18 energy managers and the completion of over 16 energy assessments.

#### **Existing building commissioning**

In 2021–2022, nine existing building commissioning (EBCx) projects were completed. This work generated 15 case studies, informing future projects on improving or optimizing the performance of existing equipment and systems and identifying low-cost or no-cost operational improvements.

**Tuning Up: A Framework for Existing Building Commissioning** was published and provides a blueprint for increasing the uptake of EBCx in Canada.

## Research, development and demonstration

Over \$4.4 million in funding was announced for the **Canada Home Builders' Association**. The funds will enable energy efficiency improvements in the residential sector by targeting multiple building archetypes across all climate zones in Canada. The financing will also support demonstrating costeffective approaches to achieving net-zero readiness and deep energy retrofits in houses and low-rise multi-unit residential buildings.

This is one of 18 innovative projects supported in 2021–2022 under the Energy Efficient Buildings RD&D program.

### Growth Plan – Canada Infrastructure Bank

### In 2021–2022, the Canada

Infrastructure Bank made investment commitments of more than \$1 billion to multiple projects that will advance energy efficiency. The projects included building retrofits with partners such as Johnson Controls and the Dream group of companies, a wastewater energy transfer system at Toronto Western Hospital, and district energy projects in Toronto and Mississauga, Ontario, with EnWave.





## HOMES, BUILDINGS AND COMMUNITIES

#### Energy Efficiency in Remote Indigenous communities

The Indigenous Off-diesel Initiative increased access to flexible funding for remote Indigenous communities. A total of \$1.6 million was issued in 14 prize grants to Indigenous Clean Energy Champions and their communities to continue implementing clean energy and energy efficiency projects in their remote communities. To support energy transition in rural, northern, remote and Indigenous communities, the Clean Energy for Rural and Remote Communities program has supported 112 communityled renewable energy projects since 2017–2018. The projects help to reduce the reliance on diesel and other fossil fuels for heat and power, with 26 projects completed at the end of 2021–2022.

#### **Municipal support**

Administered by the Federation of Canadian Municipalities, the Green Municipal Fund (GMF) committed \$137 million in loans and \$74 million in grants in 2021–2022. This funding supports energy efficiency and clean energy projects, including targeted support to municipal home energy retrofit programs and to energy efficiency projects in new and existing affordable housing developments.

Energy efficiency retrofits to lower GHG emissions from community buildings are supported by NRCan's Budget 2019 investment in the GMF.

#### National Housing Strategy

The Affordable home energy retrofit toolkit project, through the National Housing Strategy (NHS) from the Canada Mortgage and Housing Corporation, will offer affordable energy efficiency packages that include heat pumps and solar panels.

The NHS Solutions Labs launched a research demonstration exploring the integration of environmental performance into affordable housing.

Funded by the NHS, CleanTech Community Gateway and T'Sou-ke First Nation are partnering to develop innovative housing solutions for Indigenous communities in British Columbia that will emphasize both social and technical innovation.





## INDUSTRY

The Government of Canada continued to help industries develop and adopt clean technology in their journey to net-zero emissions – positioning them to be green and competitive.

#### Investment in energy management

An investment of \$194 million was announced to expand industrial energy management programming to further support the adoption of energy efficiency solutions by industry in Canada.

### **ENERGY STAR for Industry**

Five new facilities registered for the ENERGY STAR for Industry Challenge, under which industrial facilities work to achieve a 10% reduction in energy intensity within five years.

Seven facilities were certified under the ENERGY STAR for Industry certification program, which recognizes top energy efficiency performing facilities.

### Canada Infrastructure Bank

In 2021–2022, the Canada Infrastructure Bank invested \$220 million for Algoma Steel's conversion to the use of electric arc furnaces.

### International leadership

In December 2021, two **Canadian** organizations received an Insight Award at the annual Clean Energy Ministerial Energy Management Leadership Awards: Kruger Products and Public Services and Procurement Canada. This global awards program raises awareness of ISO 50001 certified energy management systems in industrial and commercial facilities and highlights the energy efficiency achievements of Canada's industrial sector.

At COP27, Canada announced that it will contribute **\$5 million to the Clean Energy Finance and Mobilisation program** from the Organisation for Economic Co-operation and Development. This contribution will help to strengthen domestic enabling conditions to attract finance and investments in renewables, energy efficiency, and the decarbonization of industry in emerging economies.

## EMBRACING NEW SOLUTIONS -IMPACT CANADA CRUSH IT! CHALLENGE

The Impact Canada Crush It! Challenge aimed to advance technologies that reduce energy use at mines by at least 20% by targeting one of the most energy-intensive processes: crushing and grinding rock. In 2021–2022, the six challenge finalists completed their work to develop, test and validate their new clean technology solutions.

The CanMicro solution from the Canadian Mining Innovation Council won the \$5-million Grand Prize in the summer of 2021.

CanMicro combines microwave-assisted comminution and multi-sensor ore sorting technology designed to selectively break particles and sort waste from desired minerals, reducing the requirement for crushing and grinding. CanMicro exceeded the challenge's goal, reaching over 35% energy savings across several commodities.



## **CLEAN FUELS AND TRANSPORTATION**

The Government of Canada is building momentum to decarbonize the transportation sector by making zero-emission options more accessible and affordable.

Budget 2021 announced \$67.2 million to implement and administer the Clean Fuel Standard and \$1.5 billion for a new Clean Fuels Fund. Together these investments will support building new capacity for clean fuel production, establishing sustainable biomass supply chains, and developing essential codes and standards.

Through the 2030 Emissions Reduction Plan, initiatives for zero-emission vehicles were announced. They include \$1.7 billion for light-duty vehicles, \$547.5 million for mediumand heavy-duty vehicles, \$199.6 million for existing large trucks, and \$33.8 million for hydrogen trucks.

#### **EV** infrastructure

### The Electric Vehicle Infrastructure

**Demonstration** program supported over 20 projects, including \$2.3 million to the Alberta Motor Transport Association for the **Alberta Zero-Emissions Truck Electrification Collaboration** project. This project will develop and demonstrate a hydrogen fueling station to support two long-haul heavy-duty trucks that use hydrogen fuel cells.

As of March 31, 2022, over 141,000 vehicles have been incentivized through a point of sale incentive of up to \$5,000 for the purchase or lease of eligible light-duty ZEVs.

#### Indigenous clean fuels

An investment of **\$316,250 in Indigenous Clean Energy** was announced to help support installing up to 10 Level 2 chargers and 15 fast chargers in about 20 Indigenous communities.

#### Industrial fuel switching

The Energy Innovation Program launched a \$53-million funding call for development of industrial fuel switching, clean fuels production, and hydrogen codes and standards. The goals of the funding are to accelerate developing emission-reducing technologies and to create pathways for using cleaner fuels in hard-to-abate segments of industry.

#### Investing in clean transit

Canada announced a \$2.75-billion Zero Emission Transit Fund – a five-year national program. The funding will help communities invest in zero-emission public transit and school transportation options by switching to cleaner electrical power and purchasing zero-emission public transit and associated infrastructure.

#### **Awareness building**

Two organizations received awards totaling **\$450,000** for awareness projects for ZEVs – helping Canadians learn about clean options available when choosing their next vehicle. Between 2019 and 2022, the ZEV awareness project awarded about \$2.8 million.

## BUILDING LOCAL - PREPARING CANADA'S AUTO INDUSTRY FOR THE FUTURE

The future of Canada's transportation sector is green. To create middleclass jobs and position our economy for success in a low-carbon world, the Government is bringing major international investments to Canada that will secure a strong EV battery supply chain.

In March 2022, the City of Windsor, the Province of Ontario, and the Government of Canada announced a <u>major investment</u> for a joint venture from LG Energy Solution Ltd. (a battery manufacturer) and automaker Stellantis N.V. The total investment of over Can\$5 billion is for building a facility in Canada to manufacture EV batteries.

The battery facility will be in Windsor, Ontario, and will supply Stellantis plants in Windsor and across North America. The facility will be operational by 2025, and the project is expected to create 2,500 well-paid jobs. This investment will position Canada as a global leader in the EV manufacturing supply chain, while also supporting the development of a sustainable domestic battery manufacturing sector in Canada.



## LEADING BY EXAMPLE

Net-zero operations by 2050 is a key target for the Government of Canada. Actions such as maximizing the energy efficiency of buildings and switching to lower carbon sources of energy are positioning Canada as a leader in the transition to a net-zero future.

The Greening Government Strategy has helped to reduce **overall federal GHG emissions** by 38.6% from 2005 to 2022. Between 2005–2006 and 2020–2021, **federal organizations saved** 5,139 TJ of energy and 729 kt of emissions within buildings, as well as 1,114 TJ of energy and 74 kt of emissions in fleets. This was accomplished through deep retrofits, energy performance contracts, fleet right-sizing, and purchasing ZEVs.

**Budget 2021** announced several investments to green government operations, such as the Low-carbon Fuel Procurement Program and the Federal Clean Electricity Fund.

#### **E**xamples of reducing emissions

The Department of National Defence achieved a 35.9% reduction in GHG emissions from buildings and their commercial light-duty vehicle fleet relative to 2005. As well, 34% of the commercial light-duty vehicles purchased for the department's administrative fleet were ZEVs or hybrid.

Fisheries and Oceans Canada saw a **35.9% decrease** in GHG emissions from facilities in 2021–2022 compared to 2005 emissions.

Public Services and Procurement Canada (PSPC) achieved a **57.1% reduction** in

GHG emissions in 2021–2022 compared to 2005 levels in buildings.

PSPC also achieved having 6% of office lessees reporting energy, water, and waste uses through the ENERGY STAR Portfolio Manager tool and completed climate risks and vulnerability assessments for 63 buildings.

### **Greening fleets**

The Global Affairs Canada vehicle fleet is now 71% ZEVs. Also, in 2021–2022, all the vehicles the department purchased were ZEVs.

As of March 31, 2022, 10.7% of the Government of Canada's conventional light-duty fleet were electric or hybrid.

## TRANSFORMING INSTITUTIONS-GREENING DEFENCE INFRASTRUCTURE IN NOVA SCOTIA

In June 2021, the Department of National Defence awarded a \$54-million <u>energy performance contract</u> to upgrade its facilities in Nova Scotia.

The buildings include 112 facilities at CFB Halifax, CFB Shearwater, Canadian Forces Ammunition Depot Bedford, and Defence and Research Development Canada (Atlantic).

Some of the work will be installing solar panels, energy-efficient automated lighting, and heating and cooling systems; updating central heating plants; and reducing water use. These upgrades will reduce energy costs by nearly \$3 million annually, or 19%. Energy retrofits will also lower GHG emissions by over 15,000 t per year, or 22% – the equivalent of taking over 3,250 cars off the road. This project will help the Department of National Defence meet its target of reducing GHG emissions by 40% by 2025, five years ahead of schedule. This work will provide sustainable and efficient facilities in which to work and train, while also sustaining over 200 jobs in the Halifax area during the upgrades.



## Modernizing legislation and regulation

Energy efficiency is supported by clear and targeted legislation and regulations.

The Government of Canada is reviewing and modernizing the 1992 *Energy Efficiency Act.* This will allow us to continue improving energy efficiency while also supporting broader current and future priorities, including enhancing competitiveness and promoting innovation.

Amendment 17 to the Energy Efficiency Regulations was published to strengthen energy efficiency standards for products used in our homes and businesses. It helps Canadians to benefit from lower energy bills.

The expected release of the 2022–2024 Forward Regulatory Plan was prepared for publication in 2022-2023.

### Enforcement

In the 2021–2022 fiscal year, NRCan processed 3.34 million records relating to importing regulated energy-using products to Canada.

Over 11.4 million new or revised model numbers were submitted for entry into the NRCan equipment database.

### Collaboration

Canada is working with the United States and trade partners on harmonizing energy efficiency regulatory requirements.

Canada is also engaging with international partners through multilateral groups such as the International Energy Agency's 4E (Energy Efficiency End-use Equipment) technology collaboration program.

Through the Steering Committee on Energy Efficiency, federal, provincial and territorial representatives are developing a framework on energy efficiency regulations under the **Regulatory Reconciliation and Cooperation Table**.

## LEADERSHIP IN STANDARDS AND REGULATIONS

Since 1995, standards implemented through Canada's Energy Efficiency Regulations for more than 70 product categories have saved more than 340 PJ of energy and avoided over 44 Mt of GHG emissions in 2021–2022. That is equivalent to the energy use of more than 3.3 million homes for one year.

Energy efficiency legislation and regulations contribute to energy savings and GHG emissions reductions by preventing less energy-efficient appliances and equipment from crossing provincial and international borders for sale or lease.

We are working to make legislation and regulations more flexible, agile, and effective in aligning minimum energy performance standards with net-zero goals.



## ENERGY EFFICIENCY FOR THE FUTURE

## BUILDING ON OUR ENERGY EFFICIENCY GAINS IN 2019

815 PJ of energy savings in 2019 – equivalent to the energy use of about 8 million homes in one year

Over the past 19 years, energy efficiency improvements have resulted in 8,791 PJ of energy savings

\$23.2 billion of energy costs saved

45.7 Mt of avoided emissions

Energy efficiency is an essential part of a net-zero future. Our homes, buildings, and communities; industry; transportation; our use of appliances and other equipment; and alternative energy sources are all contributing to a net-zero future. However, the following continued action is needed.

## Accelerating retrofits and net-zero in homes and buildings

- Advancing federal commitments tied to energy efficiency, including transitioning away from fossil-fuel home heating; net-zero emissions new builds and deep retrofits; implementing model building codes; and an approach to have homes receive EnerGuide labelling at the time of sale
- Mobilizing private sector financing and Indigenous sector financing to support deep retrofits and clean energy initiatives
- Developing the next generation of skilled energy efficiency workers by upskilling existing workers and training and building the capacity of new workers

### Leading in standards and regulations

 Advancing energy efficiency with provinces and territories through cooperation and alignment of building and energy codes and other regulations, while recognizing the different economic structures of each jurisdiction

## Driving change toward cleaner fuels

- Strengthening Canada's battery value chain and EV supply chain
- Developing a mandate to have all light-duty vehicle sales be ZEVs by 2035
- Reducing emissions from mediumand heavy-duty vehicles, with the goal of 35% of total sales being ZEVs by 2030, and 100% by 2040

## Securing Canada's industrial advantage

- Collaborating with Indigenous Peoples and communities, provinces and territories, and stakeholders to move Canada's electricity grid to net-zero emissions by 2035
- Developing a regulated Clean Electricity Standard

### Being a global leader in energy efficiency

- Investing in a circular economy through green government procurement that includes life-cycle assessment principles
- Working with provinces and territories through the Regional Energy and Resource Tables
- Introducing a new Buy Clean Strategy to support and prioritize the use of made-in-Canada, low-carbon products in Canadian infrastructure projects

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